

### **REMARKS**

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 19-33 and 37-51 are presently active in this case. The present Amendment amends Claims 19, 22 and 40.

The outstanding Office Action rejected Claims 19-20, 24, 26, 28-33, 37, 38, 42, 44 and 46-51 under 35 U.S.C. § 103(a) as unpatentable over Petermann (U.S. Patent No. 2,875,355) or Fujie et al. (U.S. Patent No. 5,025,187, herein referred to as "Fujie").

The present Amendment amends Claims 19, 22 and 40 to correct minor informalities.

Initially, Applicants respectfully request that the references cited in the Information Disclosure Statement filed March 12, 2003 be acknowledged as having been considered in the next Office Action. A copy of the PTO-1449 form and a copy of the filing receipt of the Information Disclosure Statement are submitted herewith.

In response to the rejection of Claims 19-20, 24, 26, 28-33, 37, 38, 42, 44 and 46-51 under 35 U.S.C. §103(a), Applicants respectfully traverse the rejection and request reconsideration of this rejection, as discussed next.

Briefly recapitulating, Applicants' invention, as recited in Claim 19, relates to an acoustic wave device including a layer of ferroelectric material, wherein a pitch between the first polarization domain and the second polarization domain is less than 1000nm. Claim 37 of Applicants' invention relates to an acoustic wave device, where a pitch between the first polarization domain and the second polarization domain corresponds to a frequency greater than one gigahertz.

As explained in Applicants' specification, the present invention improves such acoustic wave devices since these devices have a very small gap between two adjacent electrodes. Usually the electrodes are made of metal and are also located very closely to each

other. During operation, the metal electrodes are heated and have the tendency to creep and can therefore cause short-circuiting.<sup>1</sup> According to Applicants' invention, the acoustic wave devices can be operated at very high frequencies in the order of several GHz.<sup>2</sup> To help avoid short-circuiting of adjacent electrodes, a layer of ferroelectric material lies between a first electrode deposited on a surface of the substrate or as a constituent part of the substrate and a second electrode. The claimed invention thus leads to improved acoustic wave devices, since the pitch between the first and second polarization domain is less than 1000nm or the first and second polarization domain corresponds to a frequency above 1GHz.<sup>3</sup>

Applicants respectfully traverse the assertion that this is a case of routine optimization of a known acoustic wave device (e.g. through routine experimentation), and that the selection of appropriate dimensions for any given frequency would have been obvious to one of ordinary skill in the art.<sup>4</sup> To produce the acoustic wave device according to Claim 19 or 37, Applicants use a new device structure in microscopic dimensions in order to overcome the deficiencies of the background acoustic wave devices.

Turning now to Petermann, that patent discloses an ultrasonic transducer to generate ultrasonic waves so as to obtain a high ultrasonic intensity level in the focal region.<sup>5</sup> However, Petermann fails to teach that a pitch between the first polarization domain and the second polarization domain is less than 1000nm. In fact the outstanding Office Action admits that Petermann does "not teach the explicit pitch dimension or operation frequency in the gigahertz range."<sup>6</sup> Petermann explicitly teaches a zone plate focusing transducer with a focal length of 6cm and is configured to generate an ultrasonic wave frequency of 800kHz.<sup>7</sup> Further, Petermann discloses a numerical example of the width of the central electrode of the

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<sup>1</sup> See Applicants' specification at page 2, lines 4-7.

<sup>2</sup> See Applicants' specification at page 1, lines 4-7.

<sup>3</sup> See Applicants' specification from page 1, line 29 to page 2, line 2 and in Fig. 2.

<sup>4</sup> See outstanding Office Action at page 2, lines 21-24.

<sup>5</sup> See Petermann, for example at column 1, lines 15-19.

<sup>6</sup> See outstanding Office Action at page 2, lines 18-19.

<sup>7</sup> See Petermann, for example at column 4, lines 51-55.

ultrasonic transducer:  $D1 = 2.04 \text{ cm}$ .<sup>8</sup> Accordingly, Petermann discloses an ultrasonic transducer with *macroscopic* dimensions and *fails to teach* a pitch between the first polarization domain and the second polarization domain that is less than 1000nm.

The Fujie patent discloses an actuator for self-cleaning mirror-like objects. A disc-shaped piezo-electric element 20 is adhered to the rear of the mirror 11 and the piezo-electric element has a pair of electrodes 21 and 22. Furthermore, Fujie teaches that the piezo-electric element 20 has its own resonant frequency due to its dimensions and shape and that it is desirable for these dimensions and shape to be selected based on the resonant frequency of the mirror 11.<sup>9</sup> Fujie further teaches that an automotive mirror has a resonant frequency of 70-80kHz approximately<sup>10</sup> and the diameter of the piezo-electric element is 30mm.<sup>11</sup> Again, the actuator disclosed by Fujie has *macroscopic* dimensions. Therefore, a piezo-electric element with a diameter of 30mm and with a pair of electrodes, as taught by Fujie, *is not* a layer of ferroelectric material that includes a positive first and a negative second polarization domain, and a pitch between the first and second polarization domain that is less than 1000 nm.

Moreover, the outstanding Office Action has not provided any evidence to show that Fujie and Petermann would even enable a device such as disclosed by Applicants' Claims 19 and 37. There is no support in the record how the Fujie and Petermann references could be modified to obtain an acoustic wave device, where a pitch between the first and second polarization domain that is less than 1000nm. Such modification would require a substantial reconstruction or redesign of the elements of the Fujie and Petermann devices, and would change the basic principle of operation of the Fujie and Petermann device. Additionally,

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<sup>8</sup> See Petermann at column 4, line 67.

<sup>9</sup> See Fujie at column 4, lines 29-33.

<sup>10</sup> See Fujie at column 4, lines 33-38.

<sup>11</sup> See Fujie at column 3 in Table 1.

there is no evidence that a person of ordinary skill in the art would be motivated to perform such changes and redesign.

The Fujie device is also not concerned with producing high-frequency acoustic waves, but is concerned with generating mechanical vibration for the self-cleaning of automotive mirrors. Thus, one of ordinary skill would not have looked to Fujie to address problems in the claimed ranges.

Therefore, the applied references fail to teach or suggest every feature recited in Applicants' claims, so that Claims 19-20, 24, 26, 28-33, 37, 38, 42, 44 and 46-51 are patentably distinct over the applied references. Accordingly, Applicants respectfully traverse, and request reconsideration of, the rejection based on the Fujie and Petermann patents.<sup>12</sup>

The present amendment is submitted in accordance with the provisions of 37 C.F.R. § 1.116, which after Final Rejection permits entry of certain amendments. As the present amendment corrects only minor informalities and contains arguments showing that the outstanding rejections under 35 U.S.C. § 103(a) have been overcome, the present amendment places the application in better form for consideration on appeal without raising new issues requiring further consideration and/or search. It is therefore respectfully requested that 37 C.F.R. § 1.116 be liberally construed, and that the present amendment be entered.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal Allowance. A Notice of Allowance for Claims 19-33 and 37-51 is earnestly solicited.

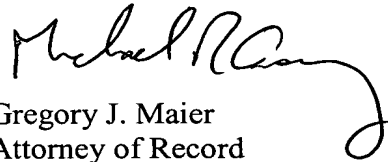
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<sup>12</sup> See MPEP 2131: "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference," (Citations omitted) (emphasis added). See also MPEP 2143.03: "All words in a claim must be considered in judging the patentability of that claim against the prior art."

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact Applicants' undersigned representative at the below listed telephone number.

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